4.7 TRANSPORTATION AND CIRCULATION

The information contained in this section is based on the *SR-22 West Orange County Connection (WOCC) Traffic/Circulation Impact Report* and the *Traffic/Circulation Report Reduced Build Alternative Addendum* (June 2002), both of which are available under a separate cover at the Department and OCTA. These studies analyze the potential impacts to traffic and circulation that would occur from the four alternatives proposed for the SR-22/WOCC. This section includes discussions of impacts and mitigation measures related to traffic and circulation in the study area.

As previously discussed in Section 2.2.1, the (Enhanced) Reduced Build Alternative is a slight modification of the Reduced Build Alternative proposed in the August 2001 DEIR/EIS. The difference between the Reduced Build Alternative and the (Enhanced) Reduced Build Alternative is that the eastern portion of the Mainline, previously proposed to end at Glassell Street, has been extended to approximately SR-55. The direct connector to SR-55 is not part of the (Enhanced) Reduced Build Alternative. An auxiliary lane has been added from Glassell Street to Tustin Avenue in the eastbound direction. Please refer to Table 2.2-1 for the list of features for the (Enhanced) Reduced Build Alternative. Note, the TSM/Expanded Bus Service Alternative was rejected as a standalone proposal; however, elements from this alternative are included in the (Enhanced) Reduced Build Alternative. The refinement to the right-of-way and the modification to the Pearce Street pedestrian overcrossing would have no effects to traffic and circulation.

Some of the revisions to the DEIR/EIS, presented in this section are based on additional engineering work performed, subsequent planning efforts, and comments received from the public during the period of the August 2001 DEIR/EIS. The comments and responses to comments are attached as Appendix A of this FEIR/EIS (Volumes II & III).

The planning horizon for the SR-22/West Orange County Connection project is 2020[1]. For the purposes of traffic analysis, the HOV requirement is assumed to be three or more persons per vehicle (3+) in the Year 2020. This assumption is consistent with other future planning efforts and is based on the analysis of travel forecasts, that predict Orange County's HOV lanes will be congested during peak periods in 2020 with an occupancy requirement of two or more persons per vehicle (2+). Consequently, travel demand forecasts conducted for all four alternatives presume that the full Orange County HOV network would be operating under a 3+ occupancy requirement.

It is important to note, however, that the policy decision to change the HOV vehicle occupancy requirement from 2+ to 3+ has not been made. The current vehicle occupancy requirement for HOV lanes in Orange County is two or more persons per vehicle. For the Full Build and the (Enhanced) Reduced Build Alternatives, it is anticipated that HOV lanes on SR-22 would be open and operating under a 2+ occupancy requirement until such time that a policy decision is made to change the HOV network from 2+ to 3+.

4.7.1 CORRIDOR IMPACTS

4.7.1.1 CORRIDOR TRAVEL TIME SAVINGS

Table 4.7-1 shows the forecast daily and annual corridor travel time savings for all travelers whose trips would either begin or end in the SR-22 corridor in the year 2020. These savings would result from transportation system improvements included in each alternative and are compared with the baseline No Build Alternative. Time savings that take place outside of the corridor due to improvements in traffic flow in the surrounding road network as a result of the proposed project should be noted. These are depicted in Table 4.7-1. These numbers provide an overall assessment of the mobility improvement in SR-22 and the surrounding road network offered by each alternative.

[1] Projections for 2020 have been used in this Final EIR/EIS. At the time the Draft EIR/EIS was prepared, the 1998 RTP was the latest approved regional planning document, and it used 2020 projections. In April 2001, the 2001 RTP was approved; however, to provide consistent analysis over the study documents, 2020 is being used as the planning horizon. The Department is not expecting major changes in traffic volumes between 2020 and 2025.

Table 4.7-1
TIME SAVINGS FOR TRIPS BEGINNING AND/OR ENDING IN SR-22 CORRIDOR

Daily Travel Time Savings (compared to No Build Alternative)			Annual Travel Time Savings (compared to No Build Alternative)		
TSM/Expanded Bus Service Alternative	Full Build Alternative	(Enhanced) Reduced Build Alternative	TSM/Expanded Bus Service Alternative	Full Build Alternative	(Enhanced) Reduced Build Alternative
12,190 hours	28,660 hours	19,130 hours	3,658,000 hours	8,597,000 hours	5,740,000 hours

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
Note: annual travel time savings has been rounded to the nearest 1000

A. (ENHANCED) REDUCED BUILD ALTERNATIVE.

The (Enhanced) Reduced Build Alternative would produce the second largest corridor travel time savings. It would produce daily travel time savings for corridor travelers of 19,130 hours and an annual savings of 5,740,000 hours compared to the No Build Alternative. This would represent a 0.7-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22 corridor. These savings would be generated based upon the addition of HOV lanes to the corridor, which would improve travel times for HOV lane users. In addition, a shift of vehicles to the HOV lanes would allow traffic on the SR-22 mixed-flow lanes to move somewhat faster, reducing travel times. Since these features are less extensive than those of the Full Build Alternative, this alternative would generate smaller travel time savings.

Trask Avenue/Sorrell Drive Synopsis

Background

The structures design team, when reviewing the SR-22 Project plans, identified several locations where there could be potential conflicts with the location of proposed bridge columns and existing traffic conditions, primarily in left-turn lanes. As most of the potential conflicts involved City of Garden Grove local streets, the traffic team met with the City to discuss these issues.

It was noted that the widening of the existing SR-22 overcrossing of Trask Avenue, west of Harbor Boulevard, would require additional bridge columns in the median of Trask Avenue. These additional columns in the median supporting the westerly bridge widening will extend through the intersection of Sorrell Drive. Sorrell Drive, a north-south residential street, one block long, presently forms a "T-intersection" with Trask Avenue, an east-west arterial. Extension of the existing median on Trask Avenue westerly through the intersection to protect the new columns will result in limiting access at Sorrell Drive. Access would be limited to westbound right turns from Trask to Sorrell, and southbound right turns from Sorrell to Trask. Widening of the overcrossing would likely require acquisition of the residential property on the northeast corner of Trask/Sorrell. An alternative to the limited access of right turns into and out of Sorrel would be to cul-de-sac Sorrell Drive at Trask Avenue. Both the limited access and the cul-de-sac options would eliminate traffic that is now using Sorrel Drive between Trask Avenue and Banner Drive as an alternate route to avoid the busy intersection of Harbor Boulevard/Trask Avenue to the east. The Department and OCTA will continue its coordination with the City of Garden Grove and affected residents.

A public meeting was held by the City of Garden Grove on October 15, 2002. The City staff noted that the process required for altering access involved three basic steps. The first step is to hold a public meeting with local residents to present the issue, present the options and obtain their concerns and input. The second step is to take the issue to the City Traffic Commission, along with the input from the initial public meeting. The Traffic Commission will make a recommendation and forward it to the City

Council for final action. The City staff indicated they would conduct traffic counts in the area and arrange for an additional public meeting.

Where SR-22 crosses Trask Avenue near Sorrell Drive, the structure is also carrying the westbound (WB) onramp. Widening of the existing over crossing in the vicinity of the northeast (NE) corner of Trask/Sorrell varies between about 40 and 45 feet. Additional bridge columns will be needed in the median area of Trask Avenue, extending to the west of Sorrell. This likely would require acquisition of the property on the northeast (NE) corner.

Subsequent to the public meeting, the City conducted traffic counts on Sorrell Drive and determined the use to be approximately 1,850 vehicles per day. This is approximately 10 times the volume of a local residential street. Most of this traffic is due to motorists using Sorrell Drive as an alternative route to Harbor Boulevard. Between 150-200 vehicles travel on Sorrell Drive in both the AM and PM peak hours.

The existing median on Trask Avenue would need to be extended to the west approximately 75-100 feet which will eliminate the WB to NB left turn. This will in turn eliminate some of the detour traffic. Based on the counts, this would reduce the volumes by about 100 vehicles in the morning and 50-60 in the evening.

While a "right-turn-only" sign for SB Sorrell Drive might be the only additional traffic control needed, a more effective traffic control measure would be to implement channelization that enforces the right-turn-out only movement.

Pearce Street Pedestrian Overcrossing Synopsis

Refined engineering plans and the availability of more detailed design level surveys have identified that the Pearce Pedestrian overcrossing is in need of replacement since it would conflict with the proposed widening of the SR-22/WOCC project. The original Preliminary Engineering plans for the SR-22/WOCC pedestrian overcrossing assumed it would be replacement in kind. The Pearce Street pedestrian overcrossing is located between the Fairview Street and Harbor Boulevard exits on SR-22, just east of Harbor Boulevard. The Pearce Street pedestrian overcrossing is an existing pedestrian overcrossing that is not compliant with the Americans with Disabilities Act (ADA). The replacement of the pedestrian overcrossing would have to comply ADA standards. ADA requires a minimum of 8.3% grade, and an eight-foot width for the walkway of the pedestrian overcrossing. The existing Pearce Street pedestrian overcrossing is approximately at a 15% grade and it is approximately eight feet wide. The refined engineering plans also allowed determination of the proximity of setback for possible landscaping and determination of preliminary noise barriers. The plans for the Pearce Street pedestrian overcrossing will be finalized at the design stage of the project. The August 2001 DEIR/EIS assumed the Pearce Street pedestrian overcrossing would be replaced in-kind at the same location as the existing facility. This facility provides access for school children attending Doig Intermediate School, Eisenhower Elementary School, and Santiago High School in the community. The replacement Pearce Street pedestrian overcrossing proposed in this FEIS/EIR is ADA compliant, and would be approximately 110 meter (feet) east of the existing overcrossing. Please refer to Figure 2.2-2 b for a schematic of the replacement proposal.

In order to determine the usage of the Pearce Street, surveys were sent to residents within a half-mile radius of the pedestrian overcrossing. During the development of the FEIS/EIR, the proposed ADA compliant pedestrian overcrossing identified three residential displacements that were not previously identified during the DEIR/EIS. As part of the environmental documentation process, the Department's right-of-way staff contacted these three potential displacees. This led to concerns raised by the displacees, and the Department elected to survey the usage of the pedestrian overcrossing and hold a public meeting. At this time, the Department is recommending a right-turn only access from Sorrell Drive to westbound Trask Avenue design; a final decision will be made at the design stage. A Public Meeting was held on December 17, 2002 to present to the community the different plans to replace the existing Pearce Street pedestrian overcrossing. The purpose of the Public Meeting was to supplement the survey by sharing information with the community and to solicit their input on the replacement of the pedestrian overcrossing. Approximately 50 residents in the community attended the meeting. Comment

Forms were available at the meeting and 42 of them were received. The Pearce Street pedestrian overcrossing user survey results, as well as the Public Meeting, and the Comment Form are summarized in Section 2.2 of this chapter. The three potential displacements have been avoided by redesigning and relocating the overcrossing east of the existing location (Please see Figure 2.2-2 b for the modified proposed design of the overcrossing). Additional discussions are in Section 10.5.3, Comments and Coordination.

Entrance/exit points at the north side remains the same as the existing POC location, and the entrance/exit points on the south side is proposed to be moved approximately 100 meters from existing POC location to the east on Pearce Street, utilizing the existing Wintersburg Channel maintenance access road. The location of the POC structure has been shifted approximately 110 meters to the east on SR-22. Access would be maintained for users of the Pearce Street pedestrian overcrossing during construction of the replacement structure. Please refer to Figure 2.2-2 b for a schematic of the replacement facility.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE.

This is the baseline scenario against which the other alternatives were compared. 2. TSM/EXPANDED BUS SERVICE ALTERNATIVE.

The TSM/Expanded Bus Service Alternative would provide a daily travel time saving for corridor travelers of 12,190 hours and an annual saving of 3,658,000 hours compared to the No Build Alternative. This would represent a 0.5-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22 corridor. These savings would be generated based upon the arterial street improvements included in this alternative and the shift of travelers from auto to transit.

3. FULL BUILD ALTERNATIVE.

The Full Build Alternative would produce the largest travel time savings of the four alternatives, 28,660 daily hours and 8,597,000 annual hours as compared to the No Build Alternative. This would represent a 1.1-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22 corridor. The savings shown in Table 4.7-2 would be generated based upon the addition of HOV lanes and HOV lane connectors to the corridor, which would improve travel times for HOV lane users. In addition, a shift in vehicles to the HOV lanes would allow traffic on the SR-22 mixed-flow lanes to move somewhat faster, reducing travel times. Finally, the addition of an arterial street on the former Pacific Electric right-of-way would provide reduced travel times for some travelers.

Please see the discussions under 4.7.1.1 (A) for the proposed modifications to the Sorrell Drive/Trask Avenue intersection at the SR-22 overcrossing at Trask Avenue.

Please see the discussions under 4.7.1.1 (A) for the proposed replacement to the Pearce Street pedestrian overcrossing.

4.7.1.2 CORRIDOR VKT (VMT) AND VHT

If an alternative experiences a VKT (VMT) increase, it indicates that more vehicles would be moving through the study area. A VHT reduction and an average corridor speed increase indicate that the vehicles would be moving faster. Table 4.7-2 shows the comparative data between the No Build Alternative and the TSM/Expanded Bus Service, Full Build and (Enhanced) Reduced Build Alternatives.

Table 4.7-2
SR-22 CORRIDOR VKT (VMT) AND VHT SUMMARIES
YEAR 2020 – AVERAGE WEEKDAY

Alternative	Aggregate Summary of all Roadway Facilities		
	VKT (VMT)	VHT	Avg. Speed
No Build	16,155,410 (10,040,650)	311,360	51.8 km/h (32.2 mph)
TSM/Expanded Bus Service	16,273,600 (10,114,110)	309,980	52.5 km/h (32.6 mph)
Full Build	16,820,740 (10,453,790)	312,660	53.7 km/h (33.4 mph)
(Enhanced) Reduced Build	16,591,190 (10,311,130)	310,880	53.4 km/h (33.2 mph)

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
km/h: kilometers per hour; mph: miles per hour

The corridor-wide average speed differential between the No Build Alternative and any of the other alternatives appear to be small since the data in Table 4.7-2 are aggregated over the entire corridor for a 24-hour period and include all freeways and arterials within the defined study area. The aggregation process has diluted some substantial speed benefits gained during peak hours in certain corridor areas, as shown in Table 4.7-3.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE.

The (Enhanced) Reduced Build Alternative would result in an additional travel activity of 435,000-VKT (270,000-VMT), and a reduction of 480 VHT over the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 53.4 km/h (33.2 mph) for this alternative.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE.

The No Build Alternative is used as the baseline to which the other alternatives are compared. This alternative has the lowest VKT (VMT) at 16,155,410 (10,040,650), and a relatively high VHT at 311,360. The ratio of VKT (VMT) and VHT indicates an average speed of 51.8 km/h (32.2 mph) for this alternative.

2. TSM/EXPANDED BUS SERVICE.

As seen in Table 4.7-2, this alternative would result in 118,190 additional VKT (73,460 VMT). In addition, the VHT would be reduced by 1,380 hours compared to the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 52.5 km/h (32.6 mph) for this alternative.

3. FULL BUILD ALTERNATIVE.

This alternative would result in greater VKT (VMT) and VHT compared to the No Build Alternative; VKT (VMT) would increase by approximately 665,000 (413,000), while VHT would increase by approximately 1,300 over the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 53.7 km/h (33.4 mph) for this alternative.

4.7.1.3 PEAK PERFORMANCE AND SCREENLINE ANALYSIS

Table 4.7-3 provides a comparison of forecast year PM peak-period speeds along major segments of the SR-22 freeway among the alternatives. As seen in table 4.7-3, implementing the TSM/Expanded Bus Service, Full Build or (Enhanced) Reduced Build would achieve higher PM peak-period, peak direction travel speeds.

Table 4.7-3
YEAR 2020 PM PEAK PERIOD PERFORMANCE
PEAK DIRECTION SPEED

SR-22 Segments	No Build	TSM/Expanded Bus Service	Full Build	(Enhanced) Reduced Build
Between Orange Crush & City Drive	32 km/h (20 mph)	21 km/h (13 mph)	85 km/h (53 mph)	85 km/h (53 mph)
Between City Drive & Haster Street	43 km/h (27mph)	43 km/h (27mph)	82 km/h (51 mph)	77 km/h (48 mph)
Between Haster Street & Harbor Blvd.	48 km/h (30mph)	48 km/h (30 mph)	71 km/h (44 mph)	64 km/h (40 mph)
Between Harbor Blvd. & Euclid	50 km/h (31 mph)	50 km/h (31 mph)	72 km/h (45 mph)	61 km/h (38 mph)
Between Euclid & Brookhurst Avenue	55 km/h (34 mph)	56 km/h (35 mph)	69 km/h (43 mph)	63 km/h (39 mph)
Between Brookhurst and Magnolia	58 km/h (36 mph)	63 km/h (39 mph)	74 km/h (46 mph)	69 km/h (43 mph)
Between Magnolia & Beach Blvd.	68 km/h (42 mph)	69 km/h (43 mph)	80 km/h (50 mph)	77 km/h (48 mph)

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
* km/h: kilometers per hour; mph: miles per hour

Table 4.7-4 displays the PM peak-period statistics (for both directions) at the four screenlines selected within the study area as described in Section 3.7.1. The results of the screenline analysis are summarized in this table using traffic volumes and average speeds within SR-22 freeway (HOV and GP lanes) and arterials under the study alternatives. The table indicates that implementing the (Enhanced) Reduced Build Alternative, TSM/Expanded Bus Service or Full Build Alternative would not only serve additional traffic demand but would also achieve higher average speeds. The screenline 1 crosses I-405 and the screenline 4 crosses SR-22 and I-5. The screenlines 2 and 3 cross only SR-22. Therefore, screenlines 2 and 3 address the flow in SR-22 more directly than screenlines 1 and 4.

Table 4.7-4
YEAR 2020 PM PEAK PERIOD SCREENLINE COMPARISON
(BOTH DIRECTIONS)

Segment	Alternative	Volume	VKT (VMT)	VHT	GP Lane Speed	HOV Lane Speed	Arterial Speed
1 – West of the SR-22/I-405 Interchange	No Build	133,140	163,260 101,470	4,290	37.89 km/h 23.5 mph	97.2 km/h 60.4 mph	32.7 km/h 20.3 mph
	TSM/Expanded Bus Service	134,700	165,770 103,030	4,330	37.9 km/h 23.6 mph	96.9 km/h 60.2 mph	33.7 km/h 21.0 mph
	Full Build	139,870	172,360 107,120	4,340	38.5 km/h 23.9 mph	101.8 km/h 63.3 mph	33.7 km/h 20.9 mph
	(Enhanced) Reduced Build	**139,530**	**171,990 106,890**	**4,400**	**38.3 km/h 23.8 mph**	**101.0 km/h 62.8 mph**	**32.7 km/h 20.3 mph**
2 – Between Beach Blvd. and Magnolia St.	No Build	75,550	69,650 43.290	1,120	67.2 km/h 41.8 mph	N/A	49.2 km/h 30.5 mph
	TSM/Expanded Bus Service	79,990	70,970 44,110	1,140	67.9 km/h 42.2 mph	N/A	49.6 km/h 30.8 mph
	Full Build	93,110	93,480 58,100	1,330	74.4 km/h 46.2 mph	98.5 km/h 61.2 mph	50.6 km/h 31.5 mph
	(Enhanced) Reduced Build	**89,190**	**86,320 53,650**	**1,190**	**79.3 km/h 49.3 mph**	**109.4 km/h 68.0 mph**	**50.4 km/h 31.3 mph**
3 – Between Harbor Blvd. and Haster St.	No Build	118,370	98,820 61,420	2,390	55.3 km/h 34.4 mph	N/A	33.4 km/h 20.7 mph
	TSM/Expanded Bus Service	122,490	101,270 62,940	2,410	54.6 km/h 33.9 mph	N/A	34.8 km/h 21.6 mph
	Full Build	141,740	147,480 91,660	2,670	73.3 km/h 45.5 mph	96.1 km/h 59.7 mph	45.3 km/h 28.1 mph
	(Enhanced) Reduced Build	**132,200**	**116,170 72,200**	**2,310**	**69.4 km/h 43.1 mph**	**96.5 km/h 60.0 mph**	**37.0 km/h 23.0 mph**
4 – Between Glassell St. and Tustin Ave.	No Build	202,520	129,690 80,600	3,020	42.3 km/h 26.3 mph	73.3 km/h 45.6 mph	34.1 km/h 21.2 mph
	TSM/Expanded Bus Service	204,480	130,680 81,220	3,050	41.8 km/h 26.0 mph	73.8 km/h 45.9 mph	35.6 km/h 22.1 mph
	Full Build	210,000	136,590 84,890	3,170	40.9 km/h 25.4 mph	76.7 km/h 47.7 mph	36.4 km/h 22.6 mph
	(Enhanced) Reduced Build	**206,800**	**133,200 882,600**	**3,140**	**40.8 km/h 25.4 mph**	**77.1 km/h 47.9 mph**	**35.9 km/h 22.3 mph**

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

The (Enhanced) Reduced Build Alternative would provide substantial PM peak period speed improvements over the No Build Alternative. Table 4.7-3 indicates that the (Enhanced) Reduced Build Alternative speeds along major segments of the SR-22 freeway are 8 km/h (5 mph) to 53 km/h (33 mph) higher than the No Build Alternative speeds during the peak period.

Table 4.7-4 indicates that at Screenlines 2 and 3, the (Enhanced) Reduced Build Alternative would serve 18 and 12 percent higher traffic volumes, respectively, compared to the No Build Alternative. The average speeds in the general-purpose lanes across the same two screenlines increase by 18 and 25 percent, respectively. The substantial travel speed improvement would be the result of additional roadway capacity that would become available through the proposed HOV lane and the auxiliary lane improvements. Screenline 1 shows more modest increase in volume since no general-purpose lanes would be added as part of the project and the current volume is nearly at capacity. At Screenline 4, only a modest increase in volume is observed due to the relatively minor impact of the proposed improvements on I-5.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE.

The No Build Alternative PM Peak period provides the baseline against which the other alternatives are compared. Table 4.7-3 indicates that the No Build Alternative results in the lowest PM peak period peak direction speeds in 2020. Similarly, Table 4.7-4 indicates that the No Build Alternative results in the lowest volumes, VKT (VHT) and speeds at the screenline locations.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE.

The TSM/Expanded Bus Service Alternative would result in modest PM peak period speed improvements along some of the segments of the SR-22. As seen on table 4.7-3, the implementation of this alternative would increase the speed from 32 km/h (20 mph) to 80 km/h (50 mph) and from 58 km/h (36 mph) to 53 km/h (39 mph) along a few segments. Similarly, Table 4.7-4 indicates VKT (VMT), volumes and speeds increase modestly at some of the screenlines.

3. FULL BUILD ALTERNATIVE.

The Full Build Alternative would provide substantial PM peak period speed improvements over the No Build Alternative. Comparing the Full Build Alternative speeds along major segments of the SR-22 freeway demonstrates distinct speed increases (ranging from 12 km/h (8 mph) to 53 km/h (33 mph)) during the peak period.

Table 4.7-4 indicates that the Full Build Alternative would result in substantial improvements to volumes and speeds at Screenlines 2 and 3. Screenline 1 shows more modest increase in volume since no general-purpose lanes would be added as part of the project and the current volume is nearly at capacity. At Screenline 4, only a modest increase in volume is observed due to the relatively minor impact of the proposed improvements on I-5.

4.7.1.4 CORRIDOR TRAVEL TIME COMPARISON

Table 4.7-5 provides a comparison of forecast year 2020 PM peak-period HOV and SOV average travel times (on the highway system) between selected pairs of trip origins (O) and destinations (D) within the corridor.

Table 4.7-5
PROJECTED SOV AND HOV TRAVEL TIMES IN MINUTES[1]
YEAR 2020 – PM PEAK PERIOD

Origin	Destination	Mode[2]	No Build	TSM/ Expanded Bus Service	Full Build	(Enhanced) Reduced Build
Orange Mall		SOV	34	33	32	32
Orange	Seal Beach	HOV	34	33	27	28
Orange Mall	Belmont Shore Dr.	SOV	45	43	42	43
Orange	Long Beach	HOV	45	43	37	37
17th St. at Bristol St.	Belmont Shore Dr.	SOV	45	43	42	43
Santa Ana	Long Beach	HOV	45	43	36	37
Transit Center	Newport Avenue.	SOV	55	51	50	50
Long Beach	Tustin	HOV	41	38	34	35
Transit Center	Civic Center	SOV	45	43	42	42
Long Beach	Santa Ana	HOV	37	34	25	29
Jamboree Road	Seal Beach	SOV	39	38	35	36
Tustin		HOV	31	31	28	28
Chapman Ave.	Compton	SOV	63	63	60	62
Orange		HOV	54	54	51	51

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
[1] Rounded to the nearest minute
[2] HOV assumed to be 3+ occupants per vehicle in 2020

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

The (Enhanced) Reduced Build Alternative, because of its exclusive HOV lane access on SR-22, would provide a substantial travel time benefit over the No Build Alternative. The SOV travel time savings compared to the No Build Alternative would range between one and five minutes per vehicle and the HOV travel time savings would range between three and seven minutes per vehicle. Comparing HOV and SOV travel times within the (Enhanced) Reduced Build Alternative demonstrates the distinct travel time advantage (ranging between four and 15 minutes) HOV lanes offer over general-purpose lanes during PM peak periods.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

Under the No Build Alternative, the travel time difference between SOV and HOV would be zero for all Origin-Destination (O-D) pairs, with the exception of the O-D pairs that have access to other freeways' HOV lanes.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

TSM/Expanded Bus Service Alternative. The TSM/Expanded Bus Service Alternative travel time difference between the SOV and HOV would also be zero for all O-D pairs, except for the O-D pairs that have access to other freeways HOV lanes. The TSM/Expanded Bus Service Alternative would provide a small travel benefit, with approximately two minutes of travel time –savings on most trips over the No Build Alternative.

3. FULL BUILD ALTERNATIVE

Full Build Alternative. The Full Build Alternative, because of its exclusive HOV lane access on SR-22, would provide a substantial travel time benefit over the No Build Alternative. The SOV travel time savings compared to the No Build Alternative would range between 2 and 5 minutes per vehicle and, similarly, the HOV travel time savings would range between 3 and 8 minutes per vehicle. Comparing HOV and SOV travel times within the Full Build Alternative demonstrates the

distinct travel time advantage (ranging between 5 and 17 minutes) offered by HOV lanes over general-purpose lanes during PM peak periods.

4.7.2 FREEWAY MAINLINE IMPACTS

Table 4.7-6 summarizes the No Build, TSM/Expanded Bus Service, Full Build and (Enhanced) Reduced Build Alternatives' V/C ratios and levels of service (LOS) for various SR-22, I-405, I-605 and SR-55 freeway segments. Figure 1.2-3 in Section 1.2 provides a pictorial explanation of LOS. The LOS was determined by freeway operational analysis, which estimated the PM peak-hour V/C ratios by freeway segment. This was done in order to assess the relative traffic service levels of each of the alternatives.

The CMP, according to its traffic impact analysis guidelines, recommends a minimum LOS E standard for all key intersections and freeway segments within Orange County. If the baseline condition (2020 No Build) conforms to that recommendation, i.e., operates at LOS E or better, any proposed alternative that would deteriorate the level of service to worse than LOS E conditions would require mitigation. If the baseline condition is operating at worse than LOS E, then the proposed alternative would require mitigation only if implementing the proposed alternative would cause a 0.10 or more increase in volume-to-capacity (V/C) ratio over that of baseline condition (2020 No Build). If the V/C ratio increases less than 0.10, no mitigation would be planned.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

Implementing the (Enhanced) Reduced Build Alternative would improve the year 2020 peak-hour forecast traffic volumes capacity when compared to the No Build Alternative. Only one of the 30 SR-22 general-purpose lane segments operates at LOS F conditions. Two SR-55 HOV lane segments would also result in threshold violations (V/C increases from 1.12 to 1.38 northbound and from 1.13 to 1.23 southbound).

The SR-22 HOV lanes would generally operate in the LOS C to E range, with a few locations operating better (eastbound from Beach Boulevard to Magnolia Street and westbound between SR-55 and Main Street, and between the I-5/SR-57 Interchange and Haster Street), and one location operating at a worse level of service (westbound between Euclid Street and Brookhurst Street). In this section, the HOV traffic volumes (in the 1,600-vehicle range) would exceed the 1,500 vehicles per hour HOV lane capacity.

The (Enhanced) Reduced Build Alternative would not result in a substantial traffic operations impact on I-405, I-605 and SR-55 general-purpose lane study segments. Implementing the SR-22 HOV lane and particularly the freeway-to-freeway connectors would induce higher volumes on the existing I-405 and SR-55 HOV lanes, resulting in higher V/C ratios and worse LOS. This is true for I-405 and SR-55 because the availability of a SR-22 HOV lane (even without the SR-55 direct connection) would encourage HOVs to use the I-405 and SR-55 HOV lanes to access the SR-22 HOV lanes. The increased volumes in the HOV lanes on I-405 and SR-55 are in large part a result of the diversion of existing HOV trips in the general-purpose lanes or on the parallel arterials into the HOV lanes.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

Under the No Build Alternative, 15 of the 30 SR-22 segments would operate at LOS F conditions. Traffic operation on I-405 would operate at LOS F in the two southbound segments. Northbound I-405 as well as the I-605 and SR-55 segments in both directions would be satisfactory (LOS E or better).

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

Implementing the TSM/Expanded Bus Service Alternative would result in minor V/C ratio improvements, though the LOS would be similar to those for the No Build Alternative. Fourteen of the 30 SR-22 segments would still operate at LOS F conditions, because this alternative would not add freeway capacity. Traffic operations on I-405, I-605, and SR-55 study segments would be similar to those under the No Build Alternative. The transit improvements proposed would induce some mode

shift from auto to transit. However, the mode shift would not be substantial enough to reduce the demand and achieve the desired LOS. Implementing this alternative would not cause any threshold violations.

3. FULL BUILD ALTERNATIVE

The Full Build Alternative would better serve the year 2020 peak-hour forecast traffic volumes than the No Build or TSM/Expanded Bus Service Alternative. In both cases, these are segments that are forecast to operate at LOS E in the No Build condition, thus resulting in a threshold violation. However, in both cases there are auxiliary lanes in these segments that are not included in the capacity calculation. These auxiliary lanes would improve the weaving section to optimize the capacity of the mainline lanes, thus having a mitigating effect and reducing the level of service to less than LOS F. Two SR-55 HOV lane segments would also result in threshold violations (V/C increases from 1.12 to 1.87 northbound and from 1.13 to 1.64 southbound).

The SR-22 HOV lanes in both directions would generally operate in the LOS C to E range, except the eastbound segments between I-405 and Knott Street and between Haster Street and the I-5/SR-57 interchange. In these sections, the HOV traffic volumes (in the 1,500- to 1,700-vehicle range) would exceed the HOV 1,500 vehicles per hour lane capacity. The two-plus sensitivity analysis in shows that the two-plus HOV demand exceeds the capacity and supports the need for a three-plus occupancy policy in 2020.

The Full Build Alternative would not result in a substantial traffic operations impact on I-405, I-605 and SR-55 general-purpose lane study segments. Implementing the SR-22 HOV lane and particularly the freeway-to-freeway connectors would induce higher volumes on the existing I-405 and SR-55 HOV lanes, resulting in higher V/C ratios and worse LOS, particularly on the SR-55 HOV lanes. The increased volumes in the HOV lanes on I-405 and SR-55 are in large part a result of the diversion of existing HOV trips in the general-purpose lanes or on the parallel arterials into the HOV lanes.

Table 4.7-6
FREEWAY V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PM PEAK HOUR

Study Fwy	Study Segment Between	Year 2020 No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				(Enhanced) Reduced Build Alternative			
		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV	
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
EASTBOUND Direction																	
SR-22	SR-22/I-405 – Valley View Bl.	0.94	E			0.94	E			0.97	E	1.05	F	0.94	E	0.77	D
	Valley View Blvd. – Knott St.	0.97	E			0.97	E			0.98	E	1.15	F	0.96	E	0.86	E
	Knott St. – Beach Blvd.	0.98	E			0.98	E			1.06	F	0.87	E	1.04	F	0.58	C
	Beach Blvd. – Magnolia St.	1.05	F			1.05	F			0.93	E	0.49	C	0.89	E	0.21	A
	Magnolia St. – Brookhurst St.	1.09	F			1.08	F			0.88	E	0.91	E	0.86	E	0.63	C
	Brookhurst. – Euclid St.	1.12	F			1.10	F			0.93	E	0.71	D	0.86	E	0.71	D
	Euclid St. – Harbor Blvd.	1.15	F			1.14	F			0.78	D	0.60	C	0.91	E	0.60	C
	Harbor Blvd. – Haster St.	1.14	F			1.13	F			0.78	D	0.77	D	0.88	E	0.73	D
	Haster St. – The City Dr.	1.20	F			1.18	F			0.62	C	1.01	F	0.72	D	0.79	D
	The City Dr. – Bristol St.	1.26	F			1.26	F			0.80	E	1.01	F	0.84	D	0.79	D
	Bristol St. – I-5/SR-57 IC	1.03	F			1.02	F			0.84	D	1.17	F	0.79	D	0.96	E
	I-5/SR-57 IC – Main St.	1.02	F			1.00	F			0.86	E	0.83	D	0.96	E	0.96	E
	Main St. – Glassell St.	1.01	F			0.99	E			0.84	D	0.84	D	0.96	E	0.96	E
	Glassell St. – Tustin St.	0.92	E			0.91	E			1.06	F	0.75	D	0.92	E	0.67	C
	Tustin St. – SR-55	0.67	C			0.66	C			0.81	D	0.75	D	0.68	D	0.67	C
WESTBOUND DIRECTION																	
SR-22	SR-55 – Tustin St.	0.55	C			0.53	C			0.61	C	0.51	C	0.60	C	0.20	A
	Tustin St. – Glassell St.	0.73	D			0.71	D			0.80	D	0.51	C	0.79	D	0.20	A
	Glassell St. – Main St.	0.77	D			0.74	D			0.61	C	0.61	C	0.79	D	0.37	B
	Main St. – I-5/SR-57 IC	0.84	D			0.82	D			0.67	C	0.53	C	0.82	D	0.56	C
	I-5/SR-57 IC – Bristol St.	0.82	D			0.80	D			0.62	C	0.62	C	0.82	D	0.50	C
	Bristol St. – The City Dr.	1.23	F			1.21	F			0.74	D	0.62	C	0.99	E	0.44	B
	The City Dr. – Haster St..	0.88	E			0.88	E			0.52	C	0.53	C	0.95	E	0.44	B
	Haster St. – Harbor Blvd.	1.18	F			1.19	F			0.75	D	0.96	E	0.89	E	0.87	E
	Harbor Blvd. – Euclid St.	1.16	F			1.18	F			0.81	D	0.49	C	0.91	E	0.68	D
	Euclid St. – Brookhurst St.	1.10	F			1.10	F			0.86	E	0.89	E	0.79	D	1.08	F
	Brookhurst St. – Magnolia St.	1.03	F			1.03	F			0.85	D	0.59	C	0.83	D	0.51	C
	Magnolia St. – Beach Blvd.	0.94	E			0.94	E			0.78	D	0.57	C	0.76	D	0.49	C
	Beach Blvd. – Knott St.	0.83	D			0.83	D			0.88	E	0.66	C	0.87	E	0.58	C

Table 4.7-6 (continued)
FREEWAY V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PM PEAK HOUR

Study Fwy	Study Segment Between	Year 2020 No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				(Enhanced) Reduced Build Alternative			
		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV	
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
WESTBOUND DIRECTION																	
SR-22	Knott St. – Valley View St.	0.73	D			0.73	D			0.81	D	0.57	C	0.79	D	0.49	C
	Valley View St. – SR-22/I-405	0.75	D			0.75	D			0.81	D	0.65	C	0.79	D	0.57	C
NORTHBOUND DIRECTION																	
I-405	SR-22/I-405 – Seal Beach Blvd.	0.86	E	0.47	C	0.87	E	0.47	C	0.88	E	0.78	D	0.90	E	0.67	C
	Seal Beach Blvd. – I-605	0.84	D	0.63	C	0.84	D	0.63	C	0.85	E	0.78	D	0.87	E	0.75	D
SR-55	SR-22 – Chapman Ave.	0.79	D	1.12	F	0.79	D	1.12	F	0.81	D	1.87	F	0.80	D	1.38	F
I-605	I-405 – Katella Ave	0.63	C			0.64	C			0.67	C	0.73	D	0.70	D	0.75	D
SOUTHBOUND DIRECTION																	
I-405	I-605 – Seal Beach Blvd.	1.08	F	0.95	E	1.09	F	0.95	E	1.09	F	0.93	E	1.09	F	0.84	D
	Seal Beach Blvd. – SR-22/I-405	1.06	F	0.71	D	1.07	F	0.71	D	1.06	F	0.96	E	1.07	F	0.82	D
SR-55	Chapman Ave – SR-22	0.68	D	1.13	F	0.68	D	1.13	F	0.73	D	1.64	F	0.70	D	1.23	F
I-605	Katella Ave – I-405	0.70	D			0.72	D			0.65	C	0.61	C	0.65	C	0.57	C

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis* V/C calculations do not include auxiliary lane capacity in both directions between I-5 and Beach Boulevard, which would reduce LOS.

4.7.3 HOV CONNECTOR IMPACTS

Table 4.7-7 lists the traffic volumes on the proposed HOV direct connectors and the associated general-purpose connectors.

Table 4.7-7
FREEWAY CONNECTOR VOLUMES
AM AND PM PEAK HOUR

General-Purpose Connector	No Build		TSM/Expanded Bus Service		Full Build		(Enhanced) Reduced Build	
	AM	PM	AM	PM	AM	PM	AM	PM
Southbound I-605 to Southbound I-405	2,320	2,600	2,520	2,790	2,410	2,800	2,410	2,830
Northbound I-405 to Northbound I-605	3,470	3,010	3,550	3,040	3,910	2,980	3,970	3,280
Southbound I-405 to Eastbound SR-22	4,190	6,510	4,170	6,470	4,460	6,660	4,250	6,520
Westbound SR-22 to Northbound I-405	6,540	5,160	6,500	5,180	7,020	5,580	6,700	5,470
Eastbound SR-22 to Southbound I-5	2,060	2,140	2,120	2,190	520	690	2,060	2,070
Northbound I-5 to Westbound SR-22	2,390	2,020	2,270	2,090	1,480	1,430	2,360	2,200
Eastbound SR-22 to Northbound SR-55	2,070	2,770	2,010	2,740	2,100	3,420	2,130	2,360
Southbound SR-55 to Westbound SR-22	2,120	1,880	1,890	1,840	2,070	2,000	2,240	2,260
HOV Connector					**AM**	**PM**	**AM**	**PM**
Southbound I-605 to Southbound I-405					760	910	720	850
Northbound I-405 to Northbound I-605					540	1,090	550	1,120
Southbound I-405 to Eastbound SR-22					660	1,580	530	1,150
Westbound SR-22 to Northbound I-405					920	970	710	850
Eastbound SR-22 to Southbound I-5					270	510		
Northbound I-5 to Westbound SR-22					200	210		
Eastbound SR-22 to Northbound SR-55					440	1,120		
Southbound SR-55 to Westbound SR-22					1,630	770		

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis

Capacity of the I-405/I-605 connectors and the SR-22/I-405 connectors is assumed to be the same as the freeway mainline (2,300 vehicles per hour per lane) because of their higher-speed design. Capacity of the I-5/SR-22 and Sr-22/Sr-55 connectors is assumed to be less (2,000 vehicles per hour per lane) because of their geometry.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

The volumes on all four general-purpose connector pairs (I-605/I-405, SR-22/I-405, SR-22/I-5, SR-22/SR-55) would generally remain the same as or increase slightly over the No Build Alternative if the (Enhanced) Reduced Build Alternative is constructed. This would occur because the freeway mainline would be moving more smoothly and at a higher speed and it could thus deliver more vehicles to the freeway connectors.

Both HOV connectors included in the (Enhanced) Reduced Build Alternative (I-605/I-405, SR-22/I-405) would meet the 800 vehicles minimum criterion (in at least one peak hour) to avoid the empty lane syndrome perception, and would not exceed the 1,500 vehicles preferred maximum, at which point the connectors' traffic flow could begin to break down.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

The No Build Alternative does not include any HOV connectors and is the baseline to which the other alternatives are compared.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative does not include HOV connectors. The general-purpose connector volumes vary only slightly compared to the No Build Alternative.

3. FULL BUILD ALTERNATIVE

Three general-purpose connector pairs, I-405/I-605, SR-22/I-405 and SR-22/SR-55, would experience increased volumes with the construction of the HOV connectors. This would occur because the freeway mainline would be moving more smoothly and at a higher speed and it could thus deliver more vehicles to the freeway connectors.

The fourth general-purpose connector pair, I-5/SR-22 would experience a substantial decrease in forecasted demand. This would primarily be a result of including the Pacific Electric Arterial in the Full Build Alternative. The Pacific Electric Arterial would provide drivers an alternative to using the eastbound SR-22 to southbound I-5 general-purpose connector. So a fairly high percentage of the trips would be diverted to the Pacific Electric Arterial. However, the analysis indicates that the reverse movement (northbound I-5 to westbound SR-22) would not experience the same level of trip diversion due to PE Arterial.

Of the four HOV connectors, the one connecting SR-22 and I-5 would carry the fewest vehicles in the peak hour. It would carry less than 800 vehicles in the peak hour and would suffer from "empty lane syndrome." For that reason, this connector would be considered a less effective component of the Full Build Alternative than the other connectors would.

The HOV connector between SR-22 and SR-55 is forecasted to carry 1,630 vehicles southbound in the AM peak hour and 1,120 vehicles northbound in the PM peak hour. These volumes, combined with the forecasted volumes on the SR-55 mainline, HOV lane (2,000 southbound in the AM peak hour and 1,680 northbound in the PM peak hour), would exceed the single HOV lanes capacity on northbound and southbound SR-55 in 2020. Based solely on the traffic volumes, this HOV connector appears to be an effective Full Build Alternative component, but when coupled with the effect it would have on the SR-55 HOV operations, this connector's effectiveness decreases.

The other two HOV connectors (I-605/I-405, SR-22/I-405) would meet the 800 vehicles minimum criteria (in at least one peak hour) to avoid the empty lane syndrome perception, and would not exceed the 1,500 vehicles preferred maximum, when the connectors traffic flow could begin to break down. (The volume on the southbound I-405 to eastbound SR-22 HOV connector would actually exceed 1,500 in the PM peak hour, but by a margin small enough to be discounted.)

4.7.4 ARTERIAL IMPACTS

The study area arterials would also be affected by the proposed alternatives, as can be seen in Table 4.7-8. Table 4.7-8 presents the study area arterials' and connectors' average daily traffic and levels of service, by alternative.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

The (Enhanced) Reduced Build Alternative shows an ADT volume increase on north/south arterials and a volume reduction on two of three east/west arterials. The ADT volume increase in north-south arterials can mainly be attributed to the increased number of commuters using these streets to access the freeway in order to use the additional capacity created by the HOV lanes. In the Full Build Alternative, PE Arterial is anticipated to carry this additional demand; therefore, other arterial streets may not experience increased traffic flows.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

As can be seen in Table 4.7-8, the arterials' LOS range from LOS B on Westminster Boulevard/17th Street to LOS F on Fairview Street. The ADTs range from 12,000 (Fifth Street) to 60,000 (Harbor Boulevard).

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative shows a mixed result in ADT volume changes on east/west and north/south arterials. These volume changes are attributable to the components that would address these main cross-county streets, such as signal synchronization, changeable message signs and closed-circuit surveillance. The TSM/Expanded Bus Service Alternative would have only a negligible impact on the SR-22/I-5 general-purpose connectors forecasted demand.

3. FULL BUILD ALTERNATIVE

The Full Build Alternative includes all the TSM/Expanded Bus Service Alternative elements and serves additional traffic to and from the proposed Pacific Electric Arterial. The Pacific Electric Arterial would provide direct free-flow access into downtown Santa Ana. It would serve forecasted traffic demand of nearly 40,000 vehicles, with peak-hour traffic volumes ranging from 1,400 to 1,800 vehicles in each direction. The Full Build Alternative would accommodate this additional traffic demand, without SR-22 operations deteriorating, primarily resulting from the additional mixed-flow capacity that would become available from the mode shift to HOV lanes.

Table 4.7-8
ARTERIAL AND FREEWAY CONNECTOR LEVEL OF SERVICE (LOS)
YEAR 2020

		No Build		TSM/ Expanded Bus Service		Full Build		(Enhanced) Reduced Build (Identified Preferred)	
Arterial		**ADT***	**LOS****	**ADT**	**LOS****	**ADT***	**LOS****	**ADT***	**LOS****
Newhope Street at Westminster Boulevard		29,100	C	30,000	C	28,500	C	31,600	D
Harbor Boulevard at Westminster Boulevard		60,000	C	57,100	C	56,600	C	62,200	D
Fairview Street at Westminster Boulevard		45,800	F	49,200	F	44,700	F	47,900	F
Westminster Boulevard/17th Street at Fairview Avenue		38,700	B	45,000	C	41,700	C	44,600	C
Fifth Street at Fairview Avenue		12,000	E	11,300	D	10,700	D	11,500	E
First Street at Fairview Avenue		44,100	C	43,000	C	34,800	B	41,800	C
Connector		**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Eastbound SR-22 to southbound I-5	PHV***	2,060	2,140	2,120	2,190	520	690	2,060	2,070
	LOS	C	C	C	C	A	A	C	C
Northbound I-5 to westbound SR-22	PHV***	2,390	2,020	2,270	2,090	1,480	1,430	2,360	2,200
	LOS	F	F	F	F	D	D	F	F

* ADT forecasts were derived from adjusted estimates of daily traffic demand provided by OCTA, December 1999
** LOS designations presented above are for the PM peak hour.
*** PHV = Peak Hour Volume. LOS was estimated using a capacity of 1500 vphpl for the connectors.
Capacity of the I-5/SR-22 and SR-22/SR-55 connectors is assumed to be less than 2,000 vphpl.

The study area arterials would show some change from implementing the Pacific Electric Arterial. ADT volumes on five of the six arterials evaluated would drop by 600 to 9,300 vehicles; only Westminster Boulevard/17th Street is forecast to have an ADT increase. LOS on five of the six arterials would improve or remain unchanged from the No Build condition.

The vehicles using the Pacific Electric Arterial (39,900 per day) would include new trips, but a greater majority would be trips that were formerly on the freeway. This is evident from the forecasted demand change on the eastbound SR-22 to southbound I-5 general-purpose connector. The AM and PM peak-hour volumes would decrease by approximately 1,500 vehicles, suggesting that those vehicles would be using a different route, namely the Pacific Electric Arterial. (See Section 4.7.3 C, HOV Connector Impacts, Full Build Alternative, for additional discussion of the forecasted changes in demand on this connector.) However, the eastbound SR-22 to southbound I-5 connector is forecasted to operate below capacity in the No Build scenario without constructing the Pacific Electric Arterial, so reducing the demand on it would not improve mobility on the connector.

4.7.5 INTERSECTION IMPACTS

Table 4.7-9 summarizes the intersection volume to capacity (V/C) ratio and LOS values for the study alternatives.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

Under the (Enhanced) Reduced Build Alternative, ten of the 37 intersections would operate at LOS F conditions (27 percent). The V/C ratios at the intersections would range between 0.49 and 1.33. The (Enhanced) Reduced Build Alternative would result in improved LOS at 15 intersections while nine would deteriorate. The deterioration of LOS at the Beach Boulevard westbound off-ramp would result from geometric changes proposed for the ramps as part of the Reduced Build Alternative to replace the outdated four-quadrant cloverleaf interchange. Of the ten LOS F intersections, one would exceed CMP impact thresholds because it would deteriorate to LOS F in the AM peak period compared to LOS E under the No Build Alternative. This would occur at the Goldenwest Street/Garden Grove Boulevard westbound off-ramp intersection. This intersection would require mitigation (see Section 4.7.6). Additionally, 21 of the intersections would experience some operational improvements. This is most likely a result of the improved freeway LOS and speed, encouraging drivers to stay on the freeway rather than exiting early and using the surface street network for part of their trip.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

Of the 37 intersections studied, 17(about 46 percent) are projected to operate at LOS F levels in the PM peak period (i.e., LOS F conditions). The most congested intersections (V/C over 1.2) are:

- I-605/Katella Avenue northbound on-/off-ramps
- SR-22/Haster Street westbound on-ramp
- SR-22/Fairview Street eastbound on-ramp
- SR-22/Bristol Street eastbound on-/off-ramps
- SR-22/Main Street/Town and Country Road eastbound on-/off-ramps
- SR-22/Glassell Street westbound on-/off-ramps
- SR-22/Tustin Street eastbound off-ramp

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

Under the TSM/Expanded Bus Service Alternative, the same 17 intersections would operate at LOS F conditions. However, almost two-thirds of the V/C ratio values are the same as or slightly lower than the No Build Alternative, ranging between 0.51 and 1.36. Although the 16 intersections would operate at LOS F, they still would not exceed the CMP threshold criteria, as identified in Section 4.7.2 of this report.

3. FULL BUILD ALTERNATIVE

Under the Full Build Alternative, of the 37 intersections, only 12 would operate at LOS F conditions (32 percent). The V/C ratios would range between 0.48 and 1.34. Of the 12 LOS F intersections, three would exceed CMP impact thresholds because: 1) they would deteriorate to LOS F compared to LOS E under the No Build Alternative, or 2) the intersection was already operating at LOS F and the V/C ratio would increase by more than 0.10. These intersections include:

- Goldenwest Street westbound off-ramp
- Beach Boulevard westbound off-ramp

- Haster Street westbound off-ramp

These intersections would require mitigation (see Section 4.7.6). The deterioration of LOS at the Beach Boulevard westbound off-ramp would result from geometric changes proposed for the ramps as part of the Full Build Alternative to replace the outdated four-quadrant cloverleaf interchange. Additionally, 27 of the intersections would experience some operational improvements under the Full Build Alternative. This is most likely a result of the improved freeway LOS and speed, encouraging drivers to stay on the freeway rather than exiting early and using the surface street network for part of their trip.

Operations at the two intersections at which new Pacific Electric Arterial connections would be constructed would not experience a negative impact. The Fairview Street and Civic Center Drive intersection would improve from LOS F to LOS E in the PM as a result of adding the ramps to the Pacific Electric Arterial.

Table 4.7-9
INTERSECTION V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PEAK HOURS

Study Intersection	No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				(Enhanced) Reduced Build Alternative			
	V/C		LOS		V/C		LOS		V/C		LOS		V/C		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-605/Katella Ave. northbound ramps	1.25	1.34	F	F	1.25	1.34	F	F	1.19	1.34	F	F	1.17	1.29	F	F
I-605/Katella Ave. southbound ramps	0.86	1.11	D	*F*	0.86	1.11	D	*F*	0.81	0.99	D	E	0.81	0.93	D	E
I-405/Seal Beach northbound ramp	0.60	0.68	A	B	0.58	0.68	A	B	0.57	0.65	A	B	0.55	0.64	A	B
I-405/Seal Beach southbound ramps	0.75	0.75	C	C	0.75	0.73	C	C	0.78	0.72	C	C	0.77	0.74	C	C
SR-22/Valley View St. westbound ramps	0.96	1.10	E	*F*	0.95	1.09	E	*F*	0.88	1.12	D	F	0.96	1.11	D	F
SR-22/Valley View St. eastbound ramps	0.75	0.83	C	D	0.77	0.86	C	D	0.74	0.76	C	C	0.74	0.75	C	C
SR-22/Knott St. westbound ramps	0.73	0.95	C	E	0.73	0.96	C	E	0.83	0.97	D	E	0.75	0.95	C	E
SR-22/Goldenwest St. eastbound ramps	0.64	0.82	B	D	0.68	0.83	B	D	0.68	0.84	B	D	0.68	0.83	B	D
SR-22/Goldenwest St. westbound ramps	0.96	0.89	E	D	0.95	0.95	E	E	1.06	0.99	F	E	1.09	0.98	F	E
SR-22/Beach Blvd. westbound ramps	0.53	0.65	A	B	0.52	0.61	A	B	1.02	0.97	F	E	0.99	0.93	E	E
SR-22/Beach Blvd. eastbound ramps	0.57	0.61	A	B	0.56	0.57	A	A	0.76	0.73	C	C	0.75	0.77	C	C
SR-22/Magnolia St. eastbound ramps	0.97	1.03	E	*F*	0.98	1.06	E	F	0.84	0.90	D	D	0.84	0.90	D	D
SR-22/Magnolia St. westbound ramps	0.59	0.81	A	D	0.68	0.95	B	E	0.68	0.95	B	E	0.67	0.99	B	E
SR-22/Brookhurst St. westbound ramps	0.82	0.91	D	E	0.95	0.96	E	E	0.91	0.97	E	E	0.84	0.93	D	E
SR-22/Brookhurst St. eastbound ramps	0.77	0.93	C	E	0.79	1.00	C	E	0.56	0.96	A	E	0.60	0.98	B	E
SR-22/Euclid St. eastbound ramps	0.68	0.98	B	E	0.67	0.97	B	E	0.60	0.97	B	E	0.67	0.95	B	E
SR-22/Euclid St. westbound ramps	1.11	1.17	F	F	1.19	1.16	F	F	1.01	1.12	F	F	1.09	1.14	F	F
SR-22/Harbor Blvd. westbound ramps	0.75	0.89	C	D	0.74	0.89	C	D	0.80	0.99	C	E	0.79	0.96	C	E
SR-22/Harbor Blvd. eastbound ramps	0.52	0.65	A	B	0.56	0.71	A	C	0.54	0.64	A	B	0.54	0.71	A	C
SR-22/Haster St. westbound off-ramp	0.82	0.94	D	E	0.80	0.91	C	E	0.79	1.06	C	F	0.77	0.85	C	**D**

Table 4.7-9 (continued)
INTERSECTION V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PEAK HOURS

Study Intersection	No Build Alternative				TSM/Expanded Bus Service				Full Build Alternative				(Enhanced) Reduced Build Alternative			
	V/C		LOS		V/C		LOS		V/C		LOS		V/C		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
SR-22/Haster St. westbound on-ramp	0.84	1.28	D	*F*	0.93	1.18	E	*F*	0.86	1.10	D	F	0.87	0.93	D	E
SR-22/Fairview St. eastbound on-ramp	1.32	1.21	*F*	F	1.32	1.27	*F*	F	1.34	1.19	F	F	1.33	1.24	F	F
SR-22/Fairview St. eastbound off-ramp	0.81	0.71	D	C	0.76	0.71	C	C	0.78	0.71	C	C	0.79	0.74	C	C
SR-22/The City Dr. westbound ramps	1.04	1.16	*F*	*F*	1.06	0.99	*F*	E	0.64	0.72	B	C	0.62	0.86	B	D
SR-22/The City Dr. eastbound on-/off-ramps	1.05	0.92	F	E	1.11	0.79	F	C	1.03	0.99	F	E	1.03	0.90	F	D
SR-22/Bristol St. eastbound ramps	1.29	1.39	F	*F*	1.27	1.34	F	*F*	1.04	0.90	F	D	0.99	0.93	E	E
SR-22/La Veta Ave. westbound ramps	0.75	0.88	C	D	0.71	0.94	C	E	0.63	1.00	B	E	0.76	0.95	C	E
SR-22/Main St. westbound ramps	0.78	1.14	C	*F*	0.81	1.08	D	F	0.74	0.87	C	D	0.73	0.79	C	C
SR-22/Main St. eastbound ramps**	---	---	*F*	F	---	---	F	F	---	---	F	E	---	---	F	F
SR-22/Glassell St. westbound ramps	1.07	1.29	F	*F*	1.08	1.34	F	*F*	0.78	0.98	C	E	0.74	1.00	C	E
SR-22/Glassell St. eastbound ramps	0.80	1.07	C	F	0.82	1.07	D	F	0.76	0.97	C	E	0.78	0.98	C	E
SR-22/Tustin St. westbound ramps	1.12	0.78	F	C	1.16	0.76	F	C	1.14	0.79	F	C	1.10	0.80	F	C
SR-22/Tustin St. eastbound ramps	0.84	1.39	D	*F*	0.81	1.36	D	*F*	0.81	1.00	D	E	0.80	1.21	C	F
SR-55/Chapman Ave. southbound ramps	0.68	0.65	B	B	0.74	0.68	C	B	0.69	0.65	B	B	0.67	0.64	B	B
SR-55/Chapman Ave. northbound ramps	0.50	0.65	A	B	0.51	0.65	A	B	0.48	0.65	A	B	0.49	0.73	A	C
Fairview St./Civic Center Dr.*	0.90	1.04	D	*F*	0.90	1.04	D	*F*	0.83	0.97	D	E	0.89	1.01	D	F
Raitt St./Santa Ana Blvd.*	0.59	0.65	A	B	0.59	0.65	A	B	0.68	0.76	B	C	0.64	0.69	B	B

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
Shaded intersections require mitigation. See Section 4.7.6 - D.
*Surface-street intersection; includes Pacific Electric Arterial in Full Build Alternative only.
** The intersection is not signalized. The LOS was obtained using the HCM method.

Thresholds of Significance for CEQA:

- Insufficient capacity on SR-55 HOV facility for incoming SR-22 HOV traffic

CEQA Findings:

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

The (Enhanced) Reduced Build Alternative does not include the SR-22/SR-55 HOV connector which is a part of the Full Build Alternative. An HOV connector between SR-22 and SR-55 is projected to increase the demand on SR-55 north of SR-22 to a level that would far exceed the capacity of a single HOV lane. Since this alternative does not include the SR-22/SR-55 HOV connector, the impact on the SR-55 HOV facility resulting from incoming SR-22 HOV traffic would be relatively small.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

The No Build Alternative would not have impacts on the SR-55 HOV facility.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative would not include any major capital improvements to SR-22; therefore, it would have negligible impact on the capacity of the SR-55 HOV facility.

3. FULL BUILD ALTERNATIVE

Of the four proposed HOV connectors, only the SR-22/SR-55 connector would result in a negative impact to the SR-55 highway network. Implementation of this connector is projected to increase the demand on SR-55 north of SR-22 to a level that would far exceed the capacity of a single HOV lane. This impact would remain significant unless mitigated. To mitigate impacts to the SR-22/SR-55 HOV connector, it may be necessary to include an additional SR-55 HOV lane in each direction north of SR-22 for some distance until the forecasted demand drops below the single HOV lane capacity. However, this is beyond the scope of the SR-22/West Orange County Connection project and will have to be investigated if the Full Build Alternative is the preferred one. Alternatively, the SR-22/SR-55 HOV connector could be eliminated, but this is inconsistent with the Full Build Alternative.

4.7.6 MITIGATION

Several intersections and freeway mainline segments under any of the alternatives would operate below threshold criteria (below LOS E for freeway mainline segments and intersections). However, for all threshold exceedances that would exist under the baseline conditions (No Build Alternative), others would need to prepare a separate mitigation because these threshold exceedances would not be caused by this project's proposed improvement strategies. For the TSM/Expanded Bus Service, Full Build and (Enhanced) Reduced Build Alternatives' projected threshold exceedances, only those beyond the level predicted to occur with the No Build scenario were evaluated. Alternative modifications have been identified to eliminate potential threshold criteria exceedances.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

TRA-(E)RB-1. One intersection under the (Enhanced) Reduced Build Alternative would exceed CMP threshold criteria. Additional lanes will be required at this intersection. This ramp intersection modification has been incorporated into the (Enhanced) Reduced Build Alternative.

As indicated in Table 4.7-6, increases in V/C ratios in the northbound and southbound HOV lanes of SR-55 would exceed the CMP threshold criteria. Providing a second HOV lane in either direction is not recommended as an immediate mitigation measure, considering the recent widening of SR-55 and the structure replacement/modification costs. Therefore, it is recommended to provide ingress/egress points for vehicles from SR-22 at suitable distances from the interchange where the HOV volumes are lower and the CMP threshold criteria will not be violated.

Traffic flows in the general-purpose lanes of southbound and northbound SR-55 could be impacted by the relatively large number of vehicles transferring between SR-22 and the HOV lanes of SR-55. The impacts of these vehicles on the SR-55 traffic would be evaluated and mitigated through a separate project. Mitigation of the impacts may require adding a second HOV lane and/or auxiliary lanes to a suitable distance from the interchange to prevent ingress and egress of vehicles in the immediate vicinity of the interchange.

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

None planned.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

None planned.

3. FULL BUILD ALTERNATIVE

To mitigate impacts to the SR-22/SR-55 HOV connector it would be necessary to include an additional SR-55 HOV lane in each direction north of SR-22 for some distance until the forecasted demand drops below the single HOV lane capacity. This is beyond the scope of the SR-22/West Orange County Connection. Alternatively, the SR-22/SR-55 HOV connector could be eliminated, but this is inconsistent with the Full Build Alternative.

TRA-FB-1. Three intersections under the Full Build Alternative would exceed CMP threshold criteria. Additional lanes will be required at these intersections. These ramp intersection modifications have been incorporated into the Full Build Alternative.

4.7.7 RESIDUAL IMPACTS AFTER MITIGATION

This section discusses the residual impacts after implementing proposed mitigation. The only mitigation discussed is the intersection mitigation because the other mitigation components included alternative modifications that resulted in reducing the impacts to below threshold levels.

A. (ENHANCED) REDUCED BUILD ALTERNATIVE

Table 4.7-10 presents the (Enhanced) Reduced Build Alternative intersection V/C ratios with and without mitigation. Implementing the proposed mitigation would improve the V/C ratios below threshold conditions. Specifically, in the No Build Alternative all intersections would operate with a V/C ratio less than one. In the unmitigated (Enhanced) Reduced Build Alternative, the SR-22/Goldenwest Street westbound ramp intersection would operate with a V/C ratio greater than one. Increasing the V/C ratio from less than one to more than one would exceed one of the two CMP threshold criteria and, hence, would require mitigation. In the mitigated (Enhanced) Reduced Build Alternative, the SR-22/Goldenwest Street westbound ramp intersection would again operate with a V/C ratio less than one, which would meet the mitigation requirement. Residual impacts to intersections would be less than substantial because the proposed additional lanes on the ramps would be constructed within the existing state right-of-way and within the area that would be affected by construction without the proposed mitigation. As such, the proposed

traffic mitigation would not impact any known sensitive or protected resources beyond those indirect impacts already described in other sections of this report. Further, the air quality analysis was performed for both the unmitigated and mitigated conditions to assess the impact of the traffic mitigation on Air Quality. See Section 4.8.3 for more discussion.

Table 4.7-10
MITIGATED V/C RATIO
YEAR 2020 PEAK HOUR

Study Intersection	No Build Alternative V/C Ratio		Full Build Alternative V/C Ratio		Mitigated Full Build Alternative V/C Ratio		(Enhanced) Reduced Build Alternative V/C Ratio		Mitigated (Enhanced) Reduced Build alternative V/C Ratio	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
SR-22/Goldenwest Street westbound ramps	0.96	0.89	1.06	0.99	0.80	0.76	1.09	0.98	0.82	0.76
SR-22/Beach Boulevard westbound ramps	0.53	0.65	1.02	0.97	0.92	0.87	N/A	N/A	N/A	N/A
SR-22/Haster Street westbound off-ramp	0.82	0.94	0.79	1.06	0.69	0.90	N/A	N/A	N/A	N/A

B. OTHER ALTERNATIVES

1. NO BUILD ALTERNATIVE

None.

2. TSM/EXPANDED BUS SERVICE ALTERNATIVE

None.

3. FULL BUILD ALTERNATIVE

Because there is no feasible mitigation for the excess HOV traffic on SR-55 north and south of SR-22, there would be a residual and substantial traffic impact under the Full Build Alternative. The construction of the HOV connectors would require construction of additional HOV lanes on SR-55.

Table 47-10 presents the Full Build Alternative intersection V/C ratios with and without mitigation. As can be seen, implementing the proposed mitigation would improve the V/C ratios below threshold conditions. Specifically, in the No Build Alternative all three intersections would operate with a V/C ratio less than one. In the unmitigated Full Build Alternative, each intersection would operate with a V/C ratio greater than one. Increasing the V/C ratio from less than one to more than one would exceed one of the two CMP threshold criteria and, hence, would require mitigation. In the mitigated Full Build Alternative, each intersection would again operate with a V/C ratio less than one, which would meet the mitigation requirement. Residual impacts to intersections would be less than substantial because the proposed additional lanes on the ramps would be constructed within the existing state right-of-way and within the area that would be affected by construction without the

proposed mitigation. As such, the proposed traffic mitigation would not impact any known sensitive or protected resources beyond those indirect impacts already described in other sections of this report. Further, the air quality analysis was performed for both the unmitigated and mitigated conditions to assess the impact of the traffic mitigation on air quality. See Section 4.8 of this FEIS/EIR for more discussion.

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